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EXAMINER	
WEBB, GREGORY E	
ART UNIT	PAPER NUMBER
1751	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/601,659	IKEMOTO ET AL	
	Examiner	Art Unit	
	Gregory E. Webb	1751	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 June 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

The applicant's independent compositional claim is directed to two material limitations. The first limitation is a positive limitation requiring the inclusion of a fluorine compound. The second limitation is a negative limitation requiring the composition be free of dissolved oxygen.

The applicant uses the open transitional phrase "comprising" which allows for any number of additional compounds.

Concerning the first limitation, literally millions of compounds exist containing fluorine compounds.

Concerning the second limitation, various compounds will increase the oxygen content of a solution including peroxygen compound, peroxide compounds, and various other oxidizing agent. Unless these compounds are specifically required by the prior, the examiner will consider this negative limitation met pending direct material evidence demonstrating dissolved oxygen contents being higher than required by the instant claim.

Thus the applicant's claim is broadly directed to a single fluorine compound and any additional additives baring the inclusion of oxidizing agent. Such broadly described claims would be met by thousand of references. For example the following search:

"(solution or composition) and (fluorine or fluoride or fluoro or fluoric or hydrofluoric) not (peroxide or peroxygen)"

would yield over 158,000 references searching only the USPTO database.

It should be further noted that the applicant has provided no prior art references for the examiner's review.

Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Abe et al (US 6,323,169).

Stevens teaches a composition in comparative example 7 containing 0.5% ammonium fluoride, 45% dimethylacetamide and deionized water (i.e. oxygen free). Further noting the intended use of stripping photoresists.

Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Tanabe (US6,261,745). Concerning the fluorine compound and the preferred fluorinated compound, Tanabe teaches the following:

> The salt of hydrofluoric acid with the base free from metal ions may be prepared using a commercially available hydrofluoric acid having a concentration of 50-60% and adding thereto the base free from metal ions in such an amount that the resulting solution has a pH of 5-8. Ammonium fluoride is the most desirable among the salts as component (a).(see col. 4, lines 31-38)

Concerning the preferred solvent, Tanabe teaches the following:

> Examples of water-soluble organic solvents include: sulfoxides, such as dimethyl sulfoxide; sulfones, such as dimethyl sulfone, diethyl sulfone, bis(2-hydroxyethyl)sulfone and tetramethylene sulfone; amides, such as N,N-dimethylformamide, N-methylformamide, N,N-dimethylacetamide, N-methylacetamide and N,N-diethylacetamide; lactams, such as N-methyl-2-pyrrolidone, N-ethyl-2-pyrrolidone, N-propyl-2-pyrrolidone, N-hydroxymethyl-2-pyrrolidone and N-hydroxyethyl-2-pyrrolidone; imidazolidinones, such as 1,3-dimethyl-2-imidazolidinone, 1,3-diethyl-2-imidazolidinone and 1,3-diisoproyl-2-imidazolidinone;

lactones, such as .gamma.-butyrolactone and .delta.-valerolactone; and polyhydric alcohols, such as ethylene glycol, ethylene glycol monomethyl ether, ethylene glycol monoethyl ether, ethylene glycol monobutyl ether, ethylene glycol monomethyl ether acetate, ethylene glycol monoethyl ether acetate, diethylene glycol, diethylene glycol monomethyl ether, diethylene glycol monoethyl ether and diethylene glycol monobutyl ether, and derivatives thereof. These organic solvents may be used alone or in combination with one another. Preferable among these examples are dimethylsulfoxide, N,N-dimethylformamide, N,N-dimethylacetamide, N-methyl-2-pyrrolidone, 1,3-dimethyl-2-imidazolidinone, ethylene glycol and diethylene glycol monobutyl ether, which effectively remove modified photoresist films. Of these examples, dimethyl sulfoxide is particularly desirable because of its good anticorrosive effect on substrates.(see col. 4, lines 47-68)

Concerning the copper and/or, Tanabe teaches the following:

As the metallic layer, use may be made of various ones, for example, aluminum (Al); an aluminum alloy (Al alloy), such as aluminum-silicon (Al--Si), aluminum-copper (Al--Cu) or aluminum-silicon-copper (Al--Si--Cu); titanium (Ti); a titanium alloy (Ti alloy), such as titanium nitride (TiN) or a titanium-tungsten system (TiW); tantalum (Ta); tantalum nitride (TaN); tungsten (W); or tungsten nitride (WN). One or more of such metallic layers are formed onto the substrate.(see col. 1, lines 49-57)

Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Ward (US5698503).

Concerning the fluorine compound, Ward teaches the following:

> Ammonium fluoride in an amount of about 0.5 to 20% by weight of composition is an essential component of the composition. Ammonium fluoride is commercially available as a 40% aqueous solution.(see col. 3, lines 25-28)

Concerning the preferred solvent, Ward teaches the following:

> 5. The composition of claim 1 wherein said polar solvent is selected from the group consisting of dimethylsulfoxide, dimethylacetamide, N-methylpyrrolidone and gamma butyllactone.(see claim 5)

Concerning the method for removing resists and the copper substrate, Ward teaches the following:

> Representative organic polymeric materials include positive photoresists, electron beam resists, X-ray resists, ion beam resists, and the like. Specific examples of organic polymeric materials include positive resists containing phenolformaldehyde resins or poly (p-vinylphenol), polymethylmethacrylate-containing resists, and the like. Examples of plasma processing residues side wall polymers (SWP) include among others, metal-organic complexes and/or inorganic salts, oxides, hydroxides or complexes which form films or residues either alone or in combination with the organic polymer resins of a photoresist. The organic materials and/or SWP can be removed from conventional substrates known to those skilled in the art, such as silicon, silicon dioxide, aluminum, aluminum alloys,

copper, copper alloys, etc.(see col. 4, lines 32-46)

Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Sahbari (US6554912).

Concerning the fluorine compound, Sahbari teaches the following:

> The fluoride salt useful in the present invention is selected from ammonium fluoride, ammonium bifluoride, ammonium-tetramethylammonium bifluoride or mixtures thereof. The fluoride salt is typically present in the compositions of the present invention in an amount of from about 1 to about 5% wt based on the total weight of the composition, and preferably from about 1.5 to about 3% wt. The fluoride salts are generally commercially available and may be used without further purification.(see col. 5, lines 40-48)

Concerning the dissolved oxygen, Sahbari teaches the following:

> While any suitable type of water may be used in the present invention, such as deionized, Milli-Q, distilled, and the like, deionized water is typically used. Any amount of water that is greater than or equal to 5% wt may suitably be used. The practical upper limit of water is about 99% wt. Typically, water is present in an amount in the range of 5 to about 85% wt based on the total weight of the composition, preferably from about 5 to about 50% wt, and more preferably from about 10 to about 45% wt. When the compositions of the present invention are used for the removal of polymeric residue, typically 5 to about 15% wt water is useful, although greater amounts of water may be used. When the compositions of the present

invention are used for the removal of post-plasma etch polymeric residue from high aspect ratio openings, for example, vias, typically about 10 to about 45% wt water is useful, although greater amounts of water may be used.(see col. 5, lines 23-39)

Concerning the preferred solvent, Sahbari teaches the following:

7. The method of claim 3 wherein the one or more glycol ethers are selected from the group consisting of ethylene glycol monomethyl ether, diethylene glycol monomethyl ether, propylene glycol monomethyl ether, propylene glycol dimethyl ether, propylene glycol mono-n-butyl ether, dipropylene glycol monomethyl ether, dipropylene glycol dimethyl ether, dipropylene glycol mono-n-butyl ether and tripropylene glycol monomethyl ether.(see claim 7)

Concerning the method for removing resists, Sahbari teaches the following:

The present compositions are highly effective in the complete removal of the deep-UV photoresist coated on a layer of hard to remove organic, cross-linked polymeric anti-reflective coating ("ARC") polymer. It is very well known that such ARCs are cross-linked polymeric material that are very difficult to remove by conventional photoresist strippers.(see col. 8, lines 1-7)

Concerning the copper substrate, Sahbari teaches the following:

Silicon wafers containing an electroplated 100% copper layer were cut into 2 in..times.2 in. (5 cm.times.5 cm) chips and heated in 100 mL of a stripper bath at 75.degree. C. for 30 minutes, The copper plated wafers were then removed from the stripper bath. The stripper bath was then

examined for dissolved copper content using an HP-4500 inductively coupled plasma mass spectrometer ("ICP-MS"), available from Hewlett-Packard, using a cold shield plasma method. Two stripper baths of the present invention, Samples G and H, were compared with three known polymer stripper baths, comparative samples C1-C3. The compositions of the stripper baths and the amount of dissolved copper are reported in Table 3.(see example 2)

Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Wakiya (US6638899). Wakiya teaches a composition in example 1 containing 1% ammonium fluoride, 69% dimethyl sulfoxide, 0.1% ammonia, and 30% water.

Concerning the preferred solvents, Wakiya teaches the following:

Examples of such water-soluble organic solvents include: sulfoxides, such as dimethyl sulfoxide; sulfones, such as dimethyl sulfone, diethyl sulfone, bis(2-hydroxyethyl) sulfone and tetramethylene sulfone; amides, such as N,N-dimethylformamide, N-methylformamide, N,N-dimethylacetamide, N-methylacetamide and N,N-diethylacetamide; lactams, such as N-methyl-2-pyrrolidone, N-ethyl-2-pyrrolidone, N-propyl-2-pyrrolidone, N-hydroxymethyl-2-pyrrolidone and N-hydroxyethyl-2-pyrrolidone; imidazolidinones, such as 1,3-dimethyl-2-imidazolidinone, 1,3-diethyl-2-imidazolidinone and 1,3-diisopropyl-2-imidazolidinone; lactones, such as .gamma.-butyrolactone and .delta.-valerolactone; and polyhydric alcohols and derivatives thereof, such as ethylene glycol,

ethylene glycol monomethyl ether, ethylene glycol monoethyl ether, ethylene glycol monobutyl ether, ethylene glycol monomethyl ether acetate, ethylene glycol monoethyl ether acetate, diethylene glycol, diethylene glycol monomethyl ether, diethylene glycol monoethyl ether and diethylene glycol monobutyl ether. These organic solvents may be used either alone or in combination with one another. Among these examples, preferable ones are dimethyl sulfoxide, N,N-dimethylformamide, N,N-dimethylacetamide, N-methyl-2-pyrrolidone, 1,3-dimethyl-2-imidazolidinone, ethylene glycol and diethylene glycol monobutyl ether, since they are excellent in capability of stripping photoresists, modified films and residue. Among all, dimethyl sulfoxide, N-metyl-2-pyrrolidone, etc. are particularly preferable because of their good anticorrosive effects on substrates.(see cols. 4-5)

Concerning the preferred fluorinated compound, Wakiya teaches the following:

The salt of hydrofluoric acid with the base free from metal ions may be prepared using a commercially available hydrofluoric acid having a concentration of 50-60% and adding thereto the base free from metal ions in such an amount that the resulting solution preferably has a pH of about 8.5 to 10. As the salt, ammonium fluoride (NH.sub.4 F) may be the most desirable. Either one or more salts may be used as component (a).(see col. 3, lines 44-52)

Concerning the method for removing resists, Wakiya teaches the following:

13. A method of stripping photoresists, which comprises etching a substrate using a photoresist pattern formed on the substrate as a mask; ashing the

photoresist pattern; stripping the ashed photoresist pattern using the photoresist stripping solution according to any one of claims 1 to 6 and 7-12; and then rinsing the substrate with water.(see claim 13)

Concerning the copper substrate, Wakiya teaches the following:

The substrate already having an arbitrary metallic layer formed thereon may be exemplified by substrates having formed thereon films of metals including aluminum (Al); aluminum alloys (Al alloys), such as aluminum-silicon (Al--Si), aluminum-copper (Al--Cu) and aluminum-silicon-copper (Al--Si--Cu): titanium (Ti): titanium alloys (Ti alloys), such as titanium nitride (TiN) and titanium-tungsten (TiW); and copper (Cu).(see col. 8, lines 56-63)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory E. Webb whose telephone number is 571-272-1325. The examiner can normally be reached on 9:00-17:30 (m-f).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Gregory E. Webb
Primary Examiner
Art Unit 1751

gew